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PETROGRAPHICAL ABSTRACTS AND REVIEWS

EDITED BY ALBERT JOHANNSEN¹

BENEDICKS, CARL, AND TENOW, OLOF. "A Simple Method for Photographing Large Preparations in Polarized Light," *Bull. Geol. Inst. Univ. Upsala*, IX (1910), 21-23.

For the description of the comparatively simple apparatus used, reference must be made to the original paper.

W. T. SCHALLER

BOWLES, OLIVER. *Tables for the Determination of Common Rocks*. New York: Van Nostrand, 1910. 16mo, pp. 64+84 advs. 50 cents net.

Cui bono?

Written, as this book is, for "beginners in lithology," it is especially unfortunate that the author's statements are often very misleading. For example, in the chapter on "Rock Classification" the statement is made that "igneous rocks . . . represent the original solid crust of the earth," and that "sediments . . . are but modifications, or reconstructed phases, of this primary type." A short chapter on the determination of the rock-forming minerals is followed by 18 pages of tables for the determination of the common rocks. The methods of identification are given in extremely brief form, but would a "beginner," or anyone else, classify andesite, quartz porphyry, felsite, or phonolite as "ashy, and often with a few phenocrysts, mostly cellular"?

The book ends with a ten-page chapter on "Building Stones" and a seven-page glossary. The volume is No. 125 of Van Nostrand's Science Series and is uniform in size and binding with the remainder of the set.

ALBERT JOHANNSEN

BOWMAN, H. L., AND CLARKE, H. E. "On the Structure and Composition of the Chandakapur Meteoric Stone," *Min. Mag.*, XV (1910), 350-76. Pls. 2, and analyses.

A full description, with extensive chemical work, on a large piece of the meteoric stone which fell at or near Chandakapur, India, on June 6,

¹ Authors' abstracts will be welcomed and may be sent to Albert Johannsen, Walker Geological Museum, The University of Chicago, Chicago, Ill.

1838. It is an intermediate chondrite, with olivine and pyroxene as the most important constituents. Metallic iron and nickel form nearly 6 per cent, and combined iron and nickel, 5 per cent.

W. T. SCHALLER

DALE, T. NELSON. "The Cambrian Conglomerate of Ripton in Vermont," *Am. Jour. Sci.*, XXX (1910), 267-70. Figs. 3.

A conglomerate formed of pre-Cambrian pebbles generally held together in a highly metamorphosed "muscovite-quartz schist with more or less magnetite." The pebbles are a beach formation and are of local origin as is shown by their large size and by their similarity to adjacent rocks.

ALBERT JOHANNSEN

DUPARC, WUNDER, AND SABOT. "Les minéraux des pegmatites des environs d'Antsirabé à Madagascar," *Mém. Soc. Phys. et d'Hist. Nat. Genève*, XXXVI (1910), fasc. 3, 283-410.

The geology of Madagascar is briefly described and then, in detail, are described the rocks around Antsirabé. These include basalts, granites, quartz diorites, pegmatites, cipolines, quartzites, and mica schists. The localities of the pegmatites are then given in detail. The pegmatites occur chiefly in the cipoline and are formed principally of microcline and quartz, or plagioclase (near albite) and quartz. Mica, tourmaline, beryl, garnet, and pyroxene are also present.

In the second part of the paper are mineralogical descriptions of microcline, amazonite, lepidolite, lithionite (zinnwaldite), beryl (rose-pink and aquamarine), tourmaline, spodumene, spessartite, garnet, and cordierite from the mica schist of Mount Ibity.

W. T. SCHALLER

GRABHAM, G. W. "An Improved Form of Petrological Microscope; with Some General Notes on the Illumination of Microscopic Objects," *Min. Mag.*, XV (1910), 335-49. Figs. 5; pl. 1.

Suggests several improvements on a Dick microscope, namely, a better adjustment for the condenser system, a triple nose-piece, iris diaphragm, and a slot for introducing screens below the stage. The graduated circle is placed below the ocular. Several other suggested improvements have already been used on other microscopes. Several

pages are devoted to the "Illumination of the Object." An explanation of the "white-line effect" (Becke's line) is given for parallel light where the contact plane of the two minerals in question is at various inclinations.

W. T. SCHALLER

GRAYSON, H. J. "Modern Improvements in Rock Section Cutting Apparatus," *Proc. Roy. Soc. Victoria*, XXIII (1910), 65-81. Pls. 4.

Describes an apparatus, constructed for the University of Melbourne, with which the writer is able to slice, grind, and mount thin sections of about an inch in diameter and of a thickness of less than 0.001 inch, from rocks of the hardness of granite, in not more than ten minutes. Using two cuts with a diamond saw for each slide, the cost per section is about one shilling.

A mechanical device for doing the rough grinding would be an improvement. With a number of laps running simultaneously, the greater length of time required for each section would be no drawback, and there would be a considerable reduction in cost since it would not be necessary to use diamond dust.

ALBERT JOHANNSEN

GROUT, FRANK F. "The Composition of Some Minnesota Rocks and Minerals," *Science*, XXXII (1910), 312-15.

A preliminary statement regarding the composition of certain Minnesota rocks. There are given analyses of seven rocks and fourteen minerals.

Two or three types of granite occur in laccoliths of considerable size in the Keewatin schists and are considered by the author as probably of that age. These granites are intersected by diabase, quartz diabase, and quartz porphyry dikes, and there occur a few masses of gabbro. Most of the Minnesota effusive rocks belong to three types of diabase which, chemically, are classed as Hessose, Bandose, and Auvergnose.

The country rock was tested for copper. The common theory of the origin of the Lake Superior copper deposits is that of lateral secretion from the diabases. In the present tests it was found that copper occurs in all the main types of rock, and, so far as could be judged from the ten samples tested, the fresher the rock, the larger the amount of copper. It varied in amount from 0.029 to 0.012 per cent.

ALBERT JOHANNSEN

HÖGBOM, A. G. "Ueber einen Eisenmeteorit von Muonionalusta im nördlichsten Schweden," *Bull. Geol. Inst. Univ. Upsala*, IX (1910), 229-38. Pl. 1.

This is a description of the first iron meteorite found in Sweden. The essential constituents are the iron-nickel kamazite, taenite, and plessite. Troilite and daubréelite form a minor part. Chemically, the meteorite contains 91 per cent Fe and 8 per cent Ni.

W. T. SCHALLER

DE LAPPARENT, JACQUES. "Les gabbros et diorites de Saint-Quay-Portrieux et leur liaison avec les pegmatites qui les traversent," *Bull. de la Soc. Française de Minéralogie*, XXXIII (1910), 254-70.

Near Saint-Quay-Portrieux on the coast of Brittany, intrusive in mica schists, there is a mass of rather coarse hypersthene-gabbro with a periphery of dioritic facies. Both gabbro and diorite contain inclusions of a finer-grained hypersthene-bearing rock with the structure of beerbachite. These rocks are cut by dikes of aplite essentially composed of labradorite and quartz. The diorite and the marginal, but not the central, part of the gabbro are cut also by small dikes of pegmatite composed essentially of microcline, albite, quartz, and a little biotite, with local muscovite and tourmaline. The albite has crystallized before the microcline.

The principal types are represented by five analyses.

The microscope shows the hypersthene of the gabbro in process of replacement by a mixture of biotite and quartz, and the augite more or less uralitized. In the peripheral "diorite" both alterations are much more advanced; the augite is almost completely uralitized, and the hypersthene wholly replaced by biotite and quartz. The author ascribes these changes to the agency of the pegmatite and believes them to have been effected before the gabbro was fully consolidated. He considers for reasons not fully stated that the first phase was the production of soda-lime feldspar by the reaction with the femic magma of siliceous alkaline vapors, rich at first in soda. He supposes the vapors subsequently to have become more abundant and richer in potash, water, and boric acid. The quartz and biotite, it is pointed out, would be formed by combination of the constituents of hypersthene with those of potash-feldspar; there is evidence that this reaction took place in the central gabbro before the hypersthene was completely crystallized, and in the

peripheral "diorite" even before that mineral was individualized. The transformation of augite to amphibole, accompanied by crystallization of quartz, is considered to have been the final reaction, effected mainly by the water and boric acid in which the vapors became relatively richer as the consolidation of alkalis and silica progressed.

M. de Lapparent believes that the action of the kind here described is common, and especially, that it has occurred in certain American rocks.

F. C. CALKINS

MICHEL-LÉVY, ALBERT. "Les terrains primaires du Morvan et de la Loire," chap. v, "Etude pétrographique et chimique des roches éruptives du faisceau synclinal du Morvan," *Bulletin des Services de la Carte Géologique de la France*, XVIII (1908), 209-68.

The area described is part of the central plateau of France, made classic by the thorough studies of the elder Michel-Lévy and others. Its rocks furnished the basis for some important principles of the science, and some of them are illustrated in the beautiful plates that accompany the "Minéralogie Micrographique." A historical summary and bibliography relating to these early researches is given in the present work. The petrographic descriptions in this work are brief; its principal contribution is a series of chemical analyses, twenty-five in number, which are used to show the position of each rock in the American quantitative classification and in that of Michel-Lévy.

The principal deep-seated rock is a coarsely porphyritic granite (alaskose) with potash distinctly more abundant than soda. The phenocrysts of potash feldspar are the last constituents to crystallize. This rock passes into microgranite and "microgranulite." Associated diorite (hessose) and amphibolitic porphyries (andose and tonalose) are said to have been formed by digestion of calcareous sediments in the granite. No full argument in support of this assertion is made, the author evidently considering that previous work by Michel-Lévy and Lacroix has established the frequent occurrence of this type of endomorphism.

The exomorphic action of the granite has affected limestones, shales, sandstones, and conglomerates. The most interesting result of the metamorphism has been the introduction of albite and orthoclase in all these rocks, especially in close proximity to contacts, by "alkaline fumaroles" from the magma.

The volcanic rocks—of Paleozoic age—comprise: (1) Upper Devo-

nian albitophyres, in the form of breccia and tuffs, with phenocrysts of albite, orthoclase, microperthite, and rarely of brown hornblende, in a groundmass of albite microlites. In the quantitative system these belong to dacose, andose, and subrang 5 of dacose, not named nor even represented by analyses when that system was published. (2) Carboniferous orthophyres, also in the form of tuffs and breccias. The phenocrysts are of orthoclase, albite, and in some cases anorthoclase; the groundmasses where crystalline are of orthoclase microlites and poikilitic quartz; some are glassy and perlitic. They belong to alaskose, liparose, and the unnamed subrang I (perpotassic) of alaskose. (3) "Microgranulitic tuffs," consisting of fragments of andesine, bipyramidal quartz, and biotite in a chalcedonic cement. These are water laid and apparently not of purely volcanic material. They belong to toscanose and are more limy than the albitophyres. (4) "Microgranulites." Some of the rocks thus designated are hypabyssal, others, passing into "porphyre pétrosilicieux," are thick, devitrified rhyolitic flows. An analysis of the hypabyssal rock is that of a toscanose, while the two specimens analyzed of the extrusive rock are alaskose and liparose. (5) Lamprophyres. These also occur partly as thin dikes and partly as flows. The dike rocks have phenocrysts of biotite and pyroxene in a groundmass of orthoclase, plagioclase, and biotite; the lavas have phenocrysts of olivine, augite, and sometimes hypersthene, in a groundmass of plagioclase, orthoclase, and sometimes biotite. In the quantitative classification, they are harzose, shoshonose, and auruncose. Chemically both extrusive and intrusive "lamprophyres" are characterized by richness in potash, resembling in this respect the porphyritic granite from which they are supposed to be differentiates.

The author summarizes the chemical data by estimating the average composition of each group of rocks and of all the rocks together excepting the diorites, albitophyres, and granulites. With these exceptions, all are markedly consanguineous, and the general average composition has in the scheme of Michel-Lévy the same "magmatic parameters" as the granite supposed to be the "mother-rock."

The albitophyres, by their richness in soda, are in remarkable contrast to the other rocks, in which dominance of potash is general. It is a striking circumstance that names are wanting in our quantitative classification for two of the albitophyres because of their unusual richness in soda, and for two other rocks—an orthophyre and a lamprophyre—because of their unusual richness in potash.

NORDENSKJÖLD, IVAR. "Der Pegmatit von Ytterby," *Bull. Geol. Inst. Univ. Upsala*, IX (1910), 183-228.

Numerous lenses of pegmatite occur at Ytterby on Resarö Island, about 20 km. E.N.E. of Stockholm. Some of the pegmatites are found between diorite and gneiss, and others occur in hornblende gneiss. A zonal structure is noticeable, the pegmatites being finest grained near the contact. Large masses of pure red potash feldspar (microcline perthite), white plagioclase (oligoclase), and massive quartz are found in the center of the lenses. The potash feldspar is especially valuable and the minerals are mined and used in the manufacture of porcelain. Graphic granite is also abundant. Of the micas, a dark biotite is more common than muscovite. It is often chloritized and it is with this altered mica that the rare minerals fergusonite, gadolinite, etc., are found. The descriptions of the rare earth minerals, largely historical, include also yttrotantalite, allanite, xenotime, and altered zircon.

W. T. SCHALLER

RASTALL, R. H. "The Skiddaw Granite and Its Metamorphism," *Quart. Jour. Geol. Soc.* (London), LXVI (1910), 116-41. Map.

A study of the alteration produced in the sedimentary rocks of the Skiddavian Series by the intrusion of an alkali granite commonly known as the Skiddaw granite. The metamorphism extends over a considerable area, although the outcrops of granite are limited to three of rather small extent which the author supposes to be part of a large mass continuous beneath the surface. From the repetition of the same sequence of rock-types in reverse order, it appears that the structure of the region is that of a complicated anticline or syncline, the former being most probable. The position of the granite mass suggests that it was intruded along the main axis of this anticlinorium, and the author believes its injection closely followed or even accompanied the folding. If this is true, here is an example of a direct relation between intrusion and folding. The chief minerals produced by the metamorphism were cordierite, andalusite, biotite, and muscovite, with garnet and staurolite near the granite contact. The absence of cyanite and sillimanite indicates that the rocks were never subjected to a very high temperature, and all the evidence points to the maintenance of a moderate temperature for a long period of time, such as would result from the intrusion, under a thick cover, of an igneous mass not very highly heated.

ALBERT JOHANNSEN

SCHALLER, W. T. "Axinit von Californien," *Zeitschr. Kryst.*, XLVIII (1910), 148.

A chemical and crystallographic description. The conclusion is reached that axinite is composed of the two isomorphous minerals, ferroaxinite, $\text{Al}_2\text{B H Ca}_2\text{Fe Si}_4\text{O}_{16}$, and manganoaxinite, $\text{Al}_2\text{B H Ca}_2\text{Mn Si}_4\text{O}_{16}$.

AUTHOR'S ABSTRACT

SMITH, G. F. HERBERT. "A Camera-lucida Attachment for the Goniometer," *Min. Mag.*, XV (1910), 388-89. Fig. 1.

The camera lucida is used for the representation of "light figures" on imperfect crystals with rounded or striated faces, and for the delineation of small crystals.

W. T. SCHALLER

WINCHELL, ALEXANDER N. "Use of 'Ophitic' and Related Terms in Petrography," *Bull. Geol. Soc. America*, XX (1910), 661-67.

A history of the term ophitic which was introduced in the literature by Michel-Lévy in 1877. Originally defined as a texture characterized by feldspars, peculiarly grouped, inclosing more recent diallage or augite, it is at the present time used either in the original sense or applied only to those textures in which the feldspar is inclosed by large anhedral pyroxene.

The writer believes the term should be applied to all rocks having plagioclase in lath-shaped crystals which were formed before the ferromagnesian constituents, and suggests the term "poikilophitic" for that texture which is at once ophitic and poikilitic.

Alfred C. Lane, "Winchell on Ophitic Texture," *Science*, XXXII (1910), 513, says: "It seems to me that . . . a pyroxenic matrix is an essential part of the idea of the ophites. I am, however, quite willing to give up the idea that the augite must necessarily be altogether in larger grains than the feldspar."

ALBERT JOHANNSEN